



Glenn Research Center • Cleveland • Ohio

Technology Opportunity

Technology Transfer & Partnership Office

TOP3-00223

Plum Brook Facilities Sandusky, Ohio

Facility Description

The Space Power Facility (SPF) is the world's largest environmental simulation chamber measuring 100 ft in diameter by 122 ft high. This facility was designed to test nuclear and nonnuclear space hardware in a simulated low-Earth-orbit environment.

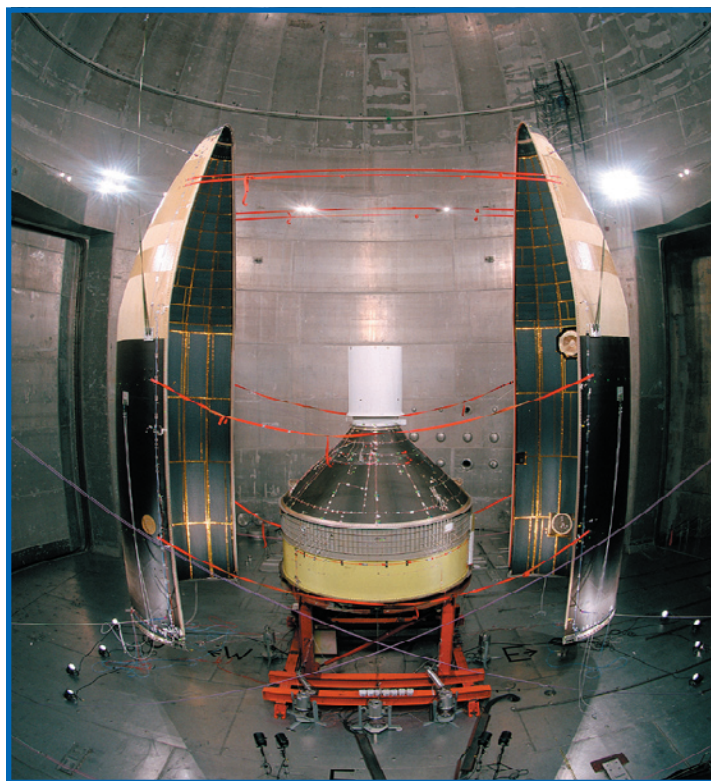
The Spacecraft Propulsion Facility (B-2) is a one-of-a-kind facility capable of testing full-scale upper-stage launch vehicles and rocket engines under simulated high-altitude conditions. The engine or vehicle can be exposed for indefinite periods to low ambient pressures, low background temperatures, and dynamic solar heating that simulates the environment hardware will encounter during orbital or interplanetary travel.

The Cryogenic Propellant Tank Facility (K-Site) is a space environment test chamber essential in the development of advanced insulation systems and on-orbit fluid transfer techniques for flight weight cryogenic fuel tanks and insulation systems. The facility is 25 ft in diameter and has a 20-ft-diameter door allowing large-scale liquid hydrogen (LH₂) experiments to be conducted safely.

The Hypersonic Tunnel Facility (HTF) originally designed to test nuclear thermal rocket nozzles, is a hypersonic (Mach 5, 6, and 7) blowdown, nonvitiated freejet facility that tests large-scale hypersonic air-breathing propulsion systems. This facility contains a large "stand-alone" experimental infrastructure that can be readily reconfigured to test a variety of ground test applications including high-energy, high-risk testing.

Facility Benefits

- Features four unique, world-class facilities
- Remote test installation site
- Large amount of acreage for diversity in testing
- Provides safe, cost-effective, responsive, and reliable performance of research testing
- Accommodates in-house, private industry, and other government research programs
- Highly qualified staff of technicians, engineers, and operators
- Accommodates in-house and private industry research programs
- High customer satisfaction



Boeing Delta IV payload fairing test.

NASA Programs and Projects Supported

- Mars lander system tests
- International Space Station hardware tests
- High-energy experiments
- Rocket-fairing separation tests
- HTF: Integrated System Test of an Air-Breathing Rocket (ISTAR) Direct Connect Combustion Rig Test

Non-NASA Programs and Projects Supported

- European Space Agency Mars Lander System tests
- European Space Agency Ariane 5 Fairing Separation tests
- Ion Engine Development tests
- Extended Expendable Launch Vehicle (EELV) Payload Fairing tests

Contacts

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Facility Testing Information

<http://facilities.grc.nasa.gov>

Space Facility Test Capabilities

HFT Hypersonic	
Test section speed, Mach	5, 6, 7
Simulated alt., ft	68 000 to 120 000
Test section Reynolds number/per ft	0.97×10^6 to 2.3×10^6
Dynamic pressure, lbf/ft ²	300 to 2200
Test section total temperature, °R	2200 to 4190
High-pressure air storage at 2600 psig, scf	675 000 GN ₂ at 45 000 psi 386 000 GO ₂ at 22 000 psi
Fuels	Liquid jet fuel Gaseous H ₂ and O ₂ Natural gas

Aero Facility Test Capabilities

	SPF	B-2	K-Site
Dimensions (diameter by length)	100 by 125 ft	100 by 125 ft	25 ft diameter
Vacuum system	(32) 48-in. ODP cryopumping (FY03)	(32) 48-in. ODP cryopumping (FY03)	(4) 35-in. ODP
No load pressure, torr	5×10^{-6}	5×10^{-6}	1×10^{-7}
Pumping speed liter/sec, air	1 400 000	1 400 000	150 000

National Aeronautics and Space Administration